

17th Australian International Aerospace Congress (AIAC17)

AIAC 2017: Innovation into
Aerospace Future

Melbourne, Australia
26 – 28 February 2017

ISBN: 978-1-5108-5668-4

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2017) by Engineers Australia
All rights reserved.

Printed by Curran Associates, Inc. (2018)

For permission requests, please contact Engineers Australia
at the address below.

Engineers Australia
Engineering House
11 National Circuit
Barton ACT 2600
Australia

Phone: +61 2 6270 6555
Fax: +61 2 6273 1488

www.engineersaustralia.org.au

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

Table of Contents

No	Reference No.	Paper Title	Author(s)	Pages
AIAC17 - Non Peer Reviewed				
1	e170226aFinal00011	On the validity of the Paris equation	E. Amsterdam	1-6
2	e170226aFinal00021	The A400M “The Airlifter of the 21st Century”	Miguel Angel Morell	7-12
3	e170226aFinal00035	Automatic Integrated Collision Avoidance System	Stan E. Jones , Captain Andrew K. Petry , Charles A. Eger , Russell M. Turner, Edward M. Griffin	13-18
4	e170226aFinal00072	The Effect of Icing on Small Unmanned Aircraft Low Reynolds Number Airfoils	Nathan Williams, Ali Benmeddour , Geoff Brian and Michael O	19-25
5	e170226aFinal00078	A Case for Australian Missile Vibration Test Capability Development	David P. Conser, Federico Lorenzin , Carl Mouser	26-34
6	e170226aFinal00091	The Effect of Adhesively Bonded Doubler Repairs on Existing Fatigue Cracks in Typical Combat Aircraft Structures	Leigh Robertson, Simon Barter, Geoff Swanton	35-43
7	e170226aFinal00095	Improvements to the structural properties of bonded composite joints using z-pins	Anil R. Ravindran , Raj B. Ladani, Shuying Wu, Chun H. Wang and Adrian P. Mouritz	44-49
8	e170226aFinal00117	Collaborative Partnership in Advanced Computational Aeroelasticity	Oleg Levinski, Robert Carrese, Pier Marzocca, Gareth Vio and Nicholas Giannelis	50-55
9	e170226aFinal00118	Improving fatigue life predictions with a crack growth rate material model based on small crack growth & legacy data	Madeleine Burchill, Simon Barter and Lok Hin Chan	56-61
—				
10	e170226aFinal00121	The Interaction between Transonic Flutter and Buffet Excitation Mechanisms for Airfoils	Robert Carrese, Pier Marzocca, and Oleg Levinski.	62-68

11	e170226aFinal00122	Nonlinear Aeroelastic Response of the AGARD 445.6 Wing due to Control Surface Freeplay	Robert Carrese, Nishit Joseph, Pier Marzocca , and Carl Mouser	69-74
12	e170226aFinal00133	The Australian Defence Force Unmanned Aerial Systems Roadmap, a decade along the unmanned journey	Lieutenant Colonel Keirin J. Joyce	75-81
13	e170226aFinal00138	Some Notes on Infrared Surface Imaging using Low Earth Orbit Nanosats and/or High Altitude UAVs	G .E. Dorrington	82-85
14	e170226aFinal00139	Understanding the mechanisms of fatigue behaviour using atomic simulations	Paul D. White, Simon Barter and Nikhil Medhekar	86-91
15	e170226aFinal00150	A GNSS multipath model for aerial navigation	Suraj Bijjahalli, Subramanian Ramasamy , Roberto Sabatini	92-97
16	e170226aFinal00167	Numerical Structural Analysis in Support of Aircraft Structural Integrity Management	Xiaobo Yu, Michael Opie, Rebecca Evans and Manfred Heller	98-103
17	e170226aFinal00179	The Effect of Viscosity on the Nonlinear Aeroelastic Aspects of a Three-Degree-of-Freedom Aerofoil System with Freeplay and Aerodynamic Nonlinearities	Michael Candon, Robert Carrese, Pier Marzocca, Hideaki Ogawa	104-109
18	e170226aFinal00196	Microstructure evolution and strengthening mechanisms of aluminium alloy A357 manufactured by Selective Laser Melting	Heng Rao a,c, Xinhua Wu b,c, Chris Davies	110-115
19	e170226aFinal00203	Surface roughness of Selective Laser Melted Ti-6Al-4V alloy components	Zhuoer Chen, Xinhua Wu, Chris Davies	116-120
20	naaiac17final00051	Torsional Fatigue Behaviour of Wrought and Selective Laser Melted Ti-6Al-4V Including As-Built and Machined Surface Finish Effects	Ali Fatemi, Reza Molaei, Shahriar Sharifimehr , Nima Shamsaei and Nam Phan	121-128
21	naaiac17final00091			
22	naaiac17final00113	Dragonfly Inspired MAVs – Adaptive and Evolutionary approaches	Kok, J.M., Fatiaki, A, Rosser, K, Chahl, J.S., and Ogunwa, T.	129-138
23	naaiac17final00151	A Virtual Pilot Assistant System for Single Pilot Operations of Commercial Transport Aircraft	Yixiang Lim, Subramanian Ramasamy, Alessandro Gardi, Roberto Sabatini	139-145

24	naaiac17final00154	UAV Delivery System Design and Analysis	John P.T. Mo, Allen Z.J. Chen	146-151
25	naaiac17final00167	Numerical Structural Analysis in Support of Aircraft Structural Integrity Management	Xiaobo Yu, Michael Opie, Rebecca Evans and Manfred Heller	152-157

AIAC17 - AIAC17 Peer Reviewed

1	e170226aFinal00005	Transverse Vibration Analysis of Tapered Rotating Beams with Rub-Induced Loading	Desmond Adair and Martin Jaeger	158-163
2	e170226aFinal00009	High strain rate tensile properties of basalt-fibre reinforced polymer composites	Ali Daliri, Arun Vijayan , Dong Ruan and Chun H. Wang	164-170
3	e170226aFinal00014	Development of motion and force feedback for a low cost PC Based Aviation Based Training Device	Savern Reweti, and Rose Davies	171-176
4	e170226aFinal00017	Advances in Using Static Load Equations for Dynamic Load Prediction	David P. Conser and Daniel O. Franke	177-184
5	e170226aFinal00018	Characteristics and analysis of biodiesel in a model jet engine with a driving cycle	Rose G. Davies, Clive E. Davies, and Colin Plaw	185-190
6	e170226aFinal00020	VALIDATION OF THE NASGRO EQUATION AND USAF CHARACTERISTIC K APPROACH FOR COMPUTING CRACK GROWTH OF AA7075-T7351 UNDER SPECTRUM LOADING	Pu Huang and Rhys Jones	191-196
7	e170226aFinal00027	The Lead Crack Concept Applied to Defect Growth in Composite Structures	L. Molent and C. Forrester	197-207
8	e170226aFinal00031	A Possible Future Short Haul Airliner	J. Page, J. Olsen	208-214
9	e170226aFinal00032	A Novel Approach to the Generation of Aircraft Collision Avoidance Advisories	Grace S. Garden, Sarah A. Mecklem, Reece A. Clothier, Brendan P. Williams and Alvin Sipe	215-226
10	e170226aFinal00033	Reduction of aircraft cabin noise using multifunctional composite laminates	Chevincee Werawanich, Everson Kandare and Akbar A. Khatibi	227-232
11	e170226aFinal00037	Investigation of the Dynamics of Leading Edge Control Surfaces for MAV Flight	Panta A, Watkins S, Marino M & Peterson P	233-238

12	e170226aFinal00041	Energy harvesting in light aircraft using an organic Rankine bottoming cycle	John Olsen	239-244
13	e170226aFinal00042	A novel regulatory framework for airworthiness certification of small UAS	Vamsi K. Madasu	245-251
14	e170226aFinal00044	Future platforms for air delivered ordnance	J. Page, J. Olsen and Z. Vulovic	252-256
15	e170226aFinal00047	StopRotor – A new VTOL aircraft configuration.	Marino. M, Ambani. J, Watkins. R and Sabatini. R	257-262
16	e170226aFinal00048	A Concurrent Design Facility Architecture for Engineering Design Education and Research	C. B. Richard Ng, Cees Bil and Pier Marzocca	263-269
17	e170226aFinal00049	An Insight into High Performance Magnesium Alloy/Nano-Metastable-Syntactic Composites	Manoj Gupta, Gururaj Parande, Vyasraj Manakari	270-277
18	e170226aFinal00054	Next-generation RPAS ground control systems: remote pilot or air traffic controller?	Alex Fisher, Reece Clothier, Peggy MacTavish and Jack Caton	278-283
19	e170226aFinal00058	Finding an Elusive Crack – Problems Related to Identifying Cracking in a Brake Assembly Piston Rod	Judy Turnbull and Geoff Head	284-296
20	e170226aFinal00059	Improving the Field of Regard of a Time-of-Flight Camera for UAV Mapping and Collision Avoidance in Cluttered Environments	Thomas Newnham, Alex Fisher, Lance Fang, Reece Clothier and Jennifer L. Palmer	297-302
21	e170226aFinal00060	An Anemometer for UAS-based Atmospheric Wind Measurements	S. Prudden, A. Fisher, A. Mohamed and S. Watkins	303-308
22	e170226aFinal00061	Review of Standard Passenger and Cabin Luggage Weight Procedures	Michael Gritsch, Cees Bil and Greg Hanlon	309-314
23	e170226aFinal00062	Effect of Building Strategy on Sample Dimensions and Properties in Direct Laser Deposition of Ti-6Al-4V	Yi Rye (Jireh) Choi, Qianchu Liu, Stephen Sun and Milan Brandt	315-320
24	e170226aFinal00063	Next Generation Debris Analysis	Jon Wingle	321-326
25	e170226aFinal00064	Extending the USAF risk of failure approach to composite repairs	Wenchen Hu, Simon Barter, John Wang, Rhys Jones and Anthony Kinloch	327-332

26	e170226aFinal00067	SCATTER IN THE GROWTH OF SMALL CRACKS IN AA7050-T7451	Pu Huang, Simon Barter, Rhys Jones, Daren Peng	333-338
27	e170226aFinal00070	Improving Workflow Efficiency in Large Volume Production in a Concurrent Design Environment	C. B. Richard Ng, Cees Bil and Pier Marzocca	339-344
28	e170226aFinal00079	Effective Repair Accounting for Mistuning Effects for an Integrated Braded Disk	G. Chen and J. Hou	345-350
29	e170226aFinal00083	Rapid Weight Sizing Methodology for Small Unmanned Aerial Systems (Quadcopter)	Michael J. Gritsch, Willem A.J. Anemaat, Shalom Johnson and Wanbo Liu	351-356
30	e170226aFinal00084	Trajectory-Coupled Solid Rocket Motor Optimisation: Enabling Next-Generation Weapon System Performance	Matthew McKinna, Jason Mossman	357-362
31	e170226aFinal00085	Repair and Manufacturing of Military Aircraft Components by Additive Manufacturing Technology	Q. Liu, R. Djugum , S. Sun, K. Walker, J. Choi1 and M. Brandt	363-368
32	e170226aFinal00086	Rapid Development of the CH-47F Flight Test Instrumentation	Samuel Boland, James Edge-Williams, Michael Keating	369-376
33	e170226aFinal00089	In-situ Thermoelastic Stress Analysis for Airframe Full Scale Fatigue Testing: An Overview of Lessons Learnt	Yi Rye (Jireh) Choi and Nik Rajic	377-382
34	e170226aFinal00096	Interaction effects of a flat plate on supersonic jet screech	Bhavraj S. Thethy and Daniel Edgington-Mitchell	383-392
35	e170226aFinal00099	Levels of Autonomy for RPAS Detect and Avoid	Reece A. Clothier , Brendan P. Williams, and Kelly Cox	393-399
36	e170226aFinal00103	Leveraging Industry Automation Techniques for Enhanced UAS System of Systems	Troy S. Bruggemann and Duncan Campbell	400-405
37	e170226aFinal00104	Analysing the Reliability of Multi UAV	Troy S. Bruggemann and Duncan Campbell	406-411
Operations				
38	e170226aFinal00106	A Behaviour Tree-based Robust Decision Framework for Enhanced UAV Autonomy	David Crofts, Troy Bruggemann, Jason Ford	412-417
39	e170226aFinal00109	Designing an Automatic Beacon Ejection System for Aircraft	Liam E. G. Peters, Cees Bil, Pier Marzocca	418-424

40	e170226aFinal00110	A comparative evaluation of a deterministic and probabilistic approach for determining safety inspection intervals of airframe structures	Ribelito F. Torregosa and Weiping Hu	425-430
41	e170226aFinal00111	Simulation of a Small Satellite Launch System with Fly-Home Components	Samuel J. Boland	431-439
42	e170226aFinal00115	Safety and Security Considerations in the Certification of Next Generation Avionics and Air Traffic Management Systems	Eranga Batuwangala, Subramanian Ramasamy, Lanka Bogoda and Roberto Sabatini	440-451
43	e170226aFinal00123	Modelling Small Electric Brushless Motors and Propellers	Matthew Anderson, KC Wong and Patrick Hendrick	452-461
44	e170226aFinal00124	Comparison and Characterization of Visual Scan Patterns of Expert and Cadet pilots in VFR landing	Jose Martinez , Cees Bil, Adrian G. Dyer and Jair E. Garcia	462-468
45	e170226aFinal00125	Biomimetic Design for Pest Bird Control UAVs: A Survey	Zihao Wang, Dr. Andrew Lucas, Dr. KC Wong and Prof. Gregory Charmitoff	469-476
46	e170226aFinal00126	The effect of service-induced dent damage on the out-of-plane strength and fatigue durability of metallic honeycomb sandwich structures	Andrew D. M. Charles and Alex B. Harman	477-482
47	e170226aFinal00127	Computer-Assisted Identification and Extraction of Geometry Features for Quantitative Fractography	Arnold Wiliem, Brian Lovell, Weiping Hu, Simon Barter	483-488
48	e170226aFinal00136	On the Potential of Lighter-Than-Air and Hybrid Aircraft for the Australian Civil Sector	G. E. Dorrington , J. Silva, C. Bil and P. Marzocca	489-494
49	e170226aFinal00140	Augmented Lift with Tip Thruster on a Rotating Lifting Surface	D.Ho, A/Prof KC. Wong	495-500
50	e170226aFinal00145	Flight Experimentation Towards Enhanced UAV Capabilities – The Multi-rotor Air-Crane	Matthew Anderson, Kai Lehmkuehler and KC Wong	501-509
51	e170226aFinal00146	Reducing Aircraft Stall Speed of Firefighting Aircraft using Retrofit Vortex Generators	Justin Fox Cees Bil Robert Carrese Greg Hanlon	510-515

52	e170226aFinal00148	Design of a Supersonic Wind Tunnel Facility	Thomas Knast and Daniel Edgington-Mitchell	516-521
53	e170226aFinal00153	Applications of Radial Basis Functions to Fluid-Structure Coupling	Adam James Murray, Gareth A. Vio , Ben Thornber and Jack Geoghegan	522-528
54	e170226aFinal00156	Characterisation of the anthropometric features of airline passengers and their impact on fuel usage in the Australian domestic aviation sector	Damien J. Melis, Jose M. Silva, Miguel A. Silvestre, Reece Clothier	529-537
55	e170226aFinal00164	Automated Manned and Unmanned Aircraft Separation Assurance and Collision Avoidance: A Unified Approach	Subramanian Ramasamy, Roberto Sabatini and Alessandro Gardi	538-544
56	e170226aFinal00165	Smart Load Spectrum Compression through the Preservation of Damage Content	Chris Wallbrink	545-550
57	e170226aFinal00171	Indoor Navigation using Distributed Ultrasonic Beacons	Rohan Kapoor, Subramanian Ramasamy, Alesandro Gardi and Roberto Sabatini	551-556
58	e170226aFinal00187	Effect of Thermal Exposure on the Degradation of Mechanical Properties of Airframe Aluminium Alloy AA7085-T7452	A. Shekhter , J. Niclis, and I. Timokhina	557-562
59	e170226aFinal00189	Microstructural Implications of Chromic Acid (Type IB) and Sulphuric Acid (Type IC) Anodising on the Fatigue Performance of AA7085-T7452 Aluminium Alloy	Suzana Turk, Alexandra Shekhter, Chris Loader, James Niclis and Khan Sharp	563-568
60	e170226aFinal00205	A new paradigm in the aerospace sector – digital enabled disruption is coming with commercial small Unmanned Aerial Systems (sUAS): who are the winners and losers?	David Carr , Dr Ameer Khan , Nathan Rickard, Dr Simon Goss and Professor Javaan Chah	569-579
61	e170226aFinal00215	Aerothermodynamic analysis of HIFiRE 8 hypersonic flight test vehicle	Malcolm Jones, Michael Roberts and Hans Alesi	580-586

62	e170226aFinal00218	Characteristics and analysis of biodiesel in a model jet engine with a driving cycle	Rose G. Davies, Clive E. Davies, and Colin Plaw	587-592
63	naaiac17final00066	Additive metal solutions to corroded wing skins in operational aircraft	Rhys Jones N. Matthews, Daren Peng, Nam Phan and Trung Nguyen	593-598
64	naaiac17final00088	Robust optimisation of time-varying aeroelastic composite structures using Multi-Particle Swarm Optimization	A. Vishwanathan, P. Cheema, G.A. Vio	599-604
65	naaiac17final00093	Aircraft Design Method for Weight, Volume and Cost of Electric Motors	Dennis van Dommelen , Shalom Johnson, Wanbo Liu , Willem A.J. Anemaat and Michael J. Gritsch	605-610
66	naaiac17final00098	Managing Uncertainty in the System Safety Assessment of Unmanned Aircraft Systems	Achim Washingtona, Reece A. Clothiera,b, Brendan P. Williamsb, Jose Silvaa	611-618
67	naaiac17final00105	Comparison and characterization of the visual scan patterns of expert and cadet pilots in a VFR landing	Jose Martinez, Cees Bil, Adrian G. Dyer and Jair E. Garcia	619-625
68	naaiac17final00116	CVD grown graphene coating on commercial copper for improving corrosion resistance	M.R. Anisur, P. Chakraborty Banerjee, R.K. Singh Raman	626-630
69	naaiac17final00178	Tougher Infrastructure Epoxy-SMCF Matrix CFRP composites	Sagar T. Cholake, Grainne Moran, Bill Joe, Yu Bai, R.K. Singh Raman, XL Zhao, Sami Rizkalla, Sri Bandyopadhyay	631-649

HUMS - Non Peer Reviewed

1	e170226aFinal00015	Machine Learning Techniques for Automatic Sensor Fault Detection in HUMS Systems	Dr. Thomas Melia, Alan Cooke, Siobhan Grayson	650-656
2	e170226aFinal00029	Landing Gear Structural Health Prognostic/Diagnostic System	C. Forrest and D. Privitera	657-662
3	e170226aFinal00071	Applying Machine Learning-Based Diagnostic Functions to Rotorcraft Safety	Daniel R. Wade, and Andrew W. Wilson	663-669
4	e170226aFinal00130	Advances in Airframe Load Monitoring Methodology for Individual Aircraft Tracking	Oleg Levinski, David P. Conser	670-675
5	e170226aFinal00102	Employing HUMS to Automate Dull Administration Tasks in Logistics and Fleet Management	Guy E. Gallasch and Nicholas Brealey	676-681
6	e170226aFinal00163	On Monitoring the Health and Remaining Useful Life of Vehicle Suspension Systems	Guy E. Gallasch and Nicholas Brealey	682-688
7	naaiac17final00016	Effecting Condition-Based Maintenance for UAVs	Joshua Segal and Yori Lavi	689-694

HUMS - Peer Reviewed

1	e170226aFinal00006	Vibration Signal Pre-processing For Spall Size Estimation in Rolling Element Bearings Using Autoregressive Inverse Filtration	Nader Sawalhi, Wenyi Wang, Andrew Becker	695-702
2	e170226aFinal00013	Modelling of Defective Bearings – The importance of the leading and trailing edge angle of a defect	Francesco Larizza , Carl Q. Howard, Steven Grainger and Wenyi Wang	703-710
3	e170226aFinal00028	Remote Location Wear Debris Analysis for Aircraft	Andrew Becker, Brian Dykas, Adrian Weller	711-717
4	e170226aFinal00036	Condition Monitoring of Engine Lubrication Oil of Military Vehicles: A Machine Learning Approach	Vu T. Le, Chee Peng Lim, Shady Mohamed, Saeid Nahavandi, Leong Yen, Guy Edward Gallasch, Stephen Baker, David Ludovici, Nick Draper and Vish Wickramanayake Tony Galati	718-724
5	e170226aFinal00074	Tracking Bearing Degradation using Gaussian Wavelets		725-731

6	e170226aFinal00131	Development of a Flight Manoeuvre Recognition Software Application for Improved Usage Monitoring of Rotary Wing Aircraft	Jack Lamshed	732-737
7	e170226aFinal00132	Solving the Mystery of the Disappearing Symptom and Why it Benefits the Product Life-Cycle	J.W.C Baker, AM FRAeS MIEAust CPEng, J.D. Cockram BEng(Hons) CEng FRAeS, G.M.Huby BEng(Hons)CEng FRAeS and R. Hornby	738-744
8	e170226aFinal00158	Acoustic Emission in Grease-Lubricated Helicopter Drivetrain Bearings	Brian Dykas, Adrian Hood, Andrew Becker	745-751
9	e170226aFinal00210	Real Time Oil Condition Monitoring, Practical Examples of Trend Analysis & Failure Prevention	Sam Botterill and Chris Greenwood	752-759

Additional Paper

6	e170226aFinal00131	Inspection of Additive Manufactured Components Using Laser Ultrasound	Geo Davis Romesh Nagarajah Suresh Palanisamy, Prabhu Rajagopal Rashid, Krishnan Balasubramaniam, Rizwan Abdul Rahman Rashid	760-764
---	--------------------	---	--	---------